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THE GARDEN CALENDAR

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A radio discussion by W. R. Beattie and M. B. Waite, Bureau of Plant Industry delivered in the Department of Agriculture period of the National Farm and Home Hour, broadcast by a network of 48 associate NBC radio stations, Tuesday, January 24, 1933.

MR. SALISBURY:

We now turn from the Household Calendar to our Garden Calendar, and Mr. Beattie has as his guest today Dr. M. B. Waite, Head of the Fruit Disease Section of the Bureau of Plant Industry, and they are going to give us a very brief outline of some of the lines of work that the Department is conducting for the benefit of the fruit growers of the country. Beattie will you lead off?-----

BEATTIE:

All right, Mr. Salisbury, and now folks, I am sure you are going to be interested in what Dr. Waite has to say about fruit diseases. Even if you're not growers, but are consumers of fruits, you will be interested, because we all like to get nice sound fruit for our own use. Dr. Waite will you tell us something about your research work with fruit diseases.

DR. WAITE:

All of you who have gardens have no doubt been impressed by the troubles and losses caused by fungous, bacterial and other diseases. Fruit growers figure their losses by thousands of dollars, for the rusts, blights, mildew and rots take their annual toll.

One of the most efficient, most spectacular, but most expensive methods of fighting these diseases is that of direct attack by spraying with poisonous sprays. In this case we are talking about fungous and not insect pests-- for they are another story. These substances are called fungicides and consist mainly of compounds of copper, sulphur, zinc and lime. It is, in fact, chemical warfare.

Only a few generations ago, people thought these fungi and the diseases they produce -- that is, the rusts, smuts, mildews, etc. -- were due to a breakdown of the plant structures. Now, thanks to the advance of the science of botany, we know that many of these troubles are caused by definite plant parasites -- fungi and bacteria -- growing in or on the host plant and producing the abnormal changes, and losses.

As you doubtless know, these fungi mostly propagate by spores which take the place of seeds. They are carried from plant to plant by the wind, or by insects, spattered by water, and so on. The problem is to kill them by spraying or dusting the surface of the plants with a protective chemical coating which will either kill the spores or prevent the entry of the germ tubes into the plant.

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BEATTIE:

Can all kinds of diseases be controlled by spraying or dusting?

DR. WAITE:

Oh no, there are many different types of diseases which cannot be fought by the spraying method.

BEATTIE:

What, for instance?

DR. WAITE:

Well, pear blight, a bacterial disease that kills the blossom clusters, twigs, branches, and sometimes whole trees of pears, apples, crabapples, quinces, and other fruits of the same family. It is not readily controlled by spraying. We worked out methods of control here in the Department of Agriculture. Here are some of the things that we found. The bacteria attack the blossoms by going in through the nectary, and are carried by bees and other insects from flower to flower. They infect the tender twig tips and other growing parts mainly through transmission by insects and puncture by insects. They work inside in the tender tissues of growing parts, inner bark, etc. The best control is by cutting out the affected area, cutting well below the disease, and then disinfecting both the wound and the tools with a 1-1000 corrosive sublimate solution, or some similar disinfectant. This is of course surgery.

The most important point however, in controlling pear blight hinges on the fact that the supply of germs for next year's blight lives over in the fleshy bark of twigs and branches in certain, and only certain, cases of the blight. These hold-over cases are the sole supply or sole infection centers. Each spring, and by finding and cutting them out in the late summer or the dormant season the disease can be greatly reduced and even exterminated in the orchards. These methods have helped to save many eastern orchards, and they virtually saved the California pear industry.

BEATTIE:

I judge this is not the only method of eradicating diseases?

DR. WAITE:

Oh no, there is a group of peach diseases, now classed as virus diseases, which means that we do not know the nature of the virus, but the diseases are infectious. They have a definite geographical range, and spread more or less in colonies. When the tree is attacked it is doomed, though it may bear inferior fruit for a year or two, and live long enough to spread the disease to neighboring trees.

BEATTIE:

Have you been able to control these diseases?

DR. WAITE:

Yes, by the rather heroic method of pulling out and destroying the entire tree. This sounds like a complete failure in treatment -- and it is just that, as far as the individual tree is concerned. But we have found that this method, which looks so bad, is nevertheless one of the most successful and economical methods of fighting plant diseases. The reason is that if thoroughly and promptly

done, if the orchards are inspected and all diseased trees found and destroyed as soon as they show the symptoms, the losses can be reduced to less than 1 per cent and often to a small fraction of 1 per cent per annum.

The process is therefore much cheaper than spraying. This method was virtually discovered by the Michigan peach growers in the case of peach yellows, but checked up and proved by the Department workers. It was applied later to the Little-peach and to some extent to peach rosette and is now being used in the control of the phony disease of the peach, which has been spreading from Georgia throughout the southern peach districts.

We have to resort to all kinds of ingenious methods of fighting diseases. My associates who are studying cranberry diseases have found that the increasingly serious disease of this crop, the False Blossom, is a virus disease and behaves like peach yellows. It was found that the transmitting agent, or vector, is a certain leaf hopper and they are drowning the leaf hopper by reflooding the bogs. This flooding does not harm the cranberry plants on account of their semi-aquatic nature.

Cedar rust or orange rust of the apple, a native disease of our wild crab-apples and red cedars, has flared up during the last two decades as one of the most serious diseases of the cultivated apple. In the Winchester, Va. district a few years ago it ruined 100,000 barrels of apples in a single season.

Cutting down the red cedars adjacent to the apple trees gives perfect, permanent control. This treatment was forecast in Department publications long before the disease was serious, and when necessity came it was put into practice, and extensive eradication of the red cedars was carried on.

BEATTIE:

Have the cultural methods anything to do with disease control?

DR. WAITE:

Yes, indeed they have. Years ago practical horticulturists found that by certain tricks of cultivation, certain methods of growing and fertilizing, they had less trouble from certain diseases. Furthermore some diseases are not caused by parasites, and control methods by spraying or eradication are not effective. One of the most successful methods of controlling chlorosis and other nutritional diseases of apples and other fruits in the Pacific Northwest is to grow cover crops of alfalfa in the orchards. The accumulation of humus overcomes the injurious soil substances which produce this disease. In this case experiment station workers, as well as the Department men, have been active. A similar disease of oranges in California and Florida and a disease of similar cause of pecans in Georgia have been worked out largely by the Department workers using suitable cover crops.

BEATTIE:

Dr. Waite, let me ask this question. Does the variety have anything to do with disease control?

DR. WAITE:

Yes, practical fruit growers and others have long known that certain varieties of fruits are less subject to attack of various kinds of diseases than others.

This is an old method, and was known long before the days of scientific research in plant diseases. But the principle of disease resistance has now been taken up and elaborately developed as one of the most effective ways of fighting disease. There are numerous triumphs of both the Department of Agriculture and State experiment station workers in the last 20 years in breeding resistant varieties of cowpeas, cotton, garden vegetables, cereals, fruit, etc.

At present we are investigating pear blight from this angle. Several years ago a number of promising crosses were made with the Bartlett, Kieffer, and other varieties, and about 3500 seedling trees were planted at the Arlington Farm, and from this group, 3 or 4 blight-resistant and otherwise desirable seedlings have been selected. Some 10,000 young trees of various ages are now growing at the Arlington Farm in this large experiment. Pears of course (and the same is true of apples) take a long time to grow to bearing age, and the difficulties of this work are much greater than with the annual garden vegetables like tomatoes, potatoes, or cabbage.

BEATTIE:

To what extent are these diseases native of this country?

DR. WAITE:

Roughly, about half of our diseases of fruits are native on the wild relatives of these fruits. For instance, the peach-yellows group, pear blight, apple cedar rust, and many others have originated on the cultivated fruits in the United States. But another half, of these diseases have come to us from the Old World, brought in accidentally with nursery stock and plants for propagation, rarely by seed. Efforts are now being made to exclude foreign disease. The introduction of citrus canker, the white-pine blister rust, the chestnut bark disease, and numerous insect pests has resulted in a Federal plant quarantining law.

BEATTIE:

Thank you Dr. Waite. Well folks, we have only touched some of the high points in this matter of fruit disease control, but enough I trust to convince you that Dr. Waite and his associates have a big job on their hands, first, to find out what causes the various troubles, and then to discover and apply a remedy.